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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/897,106	07/03/2001	Xiaochuan Zhou	4222-4002US1	9228
21586	7590	12/30/2004	EXAMINER	
VINSON & ELKINS, L.L.P. 1001 FANNIN STREET 2300 FIRST CITY TOWER HOUSTON, TX 77002-6760			HANDY, DWAYNE K	
			ART UNIT	PAPER NUMBER
			1743	

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/897,106

**Applicant(s)**

ZHOU ET AL.

**Examiner**

Dwayne K Handy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5,8-13,15,16,18,20-25,27-30,35,39-43,48,100,106 and 164-168 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,8-13,15,16,18,20-25,27-30,35,39-43,48,100,106 and 164-168 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/27/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Inventorship***

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-4, 8, 9, 18, 20-25, 29, 30 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mian et al. (6,319,469) in view of Kellogg et al. (6,143,248).

Mian teaches a microfluidic device that uses centripetal force to drive fluid movement in the microchannel network. The device is best shown in Figures 1A and 1C. It includes multiple arrays of chambers (shown as elements 12, 14, 16, etc. in Fig 1A) connected by valves (13, 15, 17, etc.). The valves may be passive structures that do not require moving parts such as a capillary microvalve (column 19, lines 25-63). Mian teaches materials of construction in columns 13 through 15 and includes both plastics and silicon as well as modified surfaces for linking of molecules (column 14, line 45 - column 15, line 15). Mian teach the placement of biomolecules in the channels or reservoirs in columns 35-37. Mian does not teach tapered channels. Kellogg also teaches a microfluidic system in which fluid flow is achieved by application of centripetal force. The fluid flow is controlled by passive valves in the form of capillary valves that stop fluid from flowing in a channel via surface forces until a pressure is applied. One particular form of the capillary valve is shown in Figure 10 and described in column 30. It is comprised of a channel that tapers to a tip. At the tip, fluid flow stops and an increase in pressure allows for the enrichment of solids at the tip. A further increase in pressure forces the fluid through the tip and down the channel. Kellogg, then, concentrates samples as well as provides fluid control in a radial system by using this tapering channel. It would have been obvious to combine the tapered valve of Kellogg with the system of Mian. One would add the tapered valve to take advantage of the

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enrichment and fluid control provided by the tapering channel of Kellogg. This would allow for the control and enrichment of fluid in the channels while requiring no valve parts.

4. Claims 15, 100, 106 and 164-168 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mian et al. (6,319,469) and Kellogg et al. (6,143,248) and further in view of Zanzucchi et al. (5,643,738). Mian and Kellogg, as combined above in paragraph 3, teach every element of claims 15, 100, 106 and 164-168 except for a window plate. Zanzucchi et al. teach a method of synthesizing a plurality of compounds in parallel on a partitioned substrate. The embodiment of the device that is most relevant to the instant claims is shown in Figures 1A-6A. The device is comprised of a disk containing a number of modules comprised of chambers (50, 34, 36, 40, 42, 44) connected by a channel (38). The number of modules formed on the disk may be 267, 534, or up to 1500 for parallel processing of samples (column 6, lines 35-45). Materials of construction are disclosed in column 6, lines 13-23 and include silicon wafers and glass. Figure 5B shows a cover plate (63) made of glass. The Examiner considers this feature as meeting the limitation of a "window plate". It would have been obvious to one of ordinary skill in the art to combine the glass plate from Zanzucchi to the combined teachings of Mian and Kellogg. One would add the glass cover plate from Zanzucchi to cover the top of the microchannels while still allowing for optical examination of the material in the channels or reservoirs.

5. Claims 5 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mian et al. (6,319,469) and Kellogg et al. (6,143,248) and further in view of Demers (5,840,256). Mian and Kellogg, as combined above in paragraph 3, teach every element of claims 5 and 10-13 except for 10,000 reaction cells and the claimed distance between the cells. Demers teaches a plate for a reaction system comprised of a cell array of up to 100,000 cells. As shown in the Table of Figure 1 and described in column 6, the plate comes in several formats including 1000, 4000 and 10,000. In order to accommodate such a large number of cells micron scale spacing is used between the cells (column 6, lines 10-63). It would have been obvious to one of ordinary skill in the art to combine the array size and spacing of Demers with the combined teachings of Mian and Kellogg. One would use the dimensions from Demers to put as many reaction cells as possible on the device. This would allow for the processing of a greater number of compounds.

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mian et al. (6,319,469) and Kellogg et al. (6,143,248) and further in view of Stabile et al. (5,872,623). Mian and Kellogg, as combined above in paragraph 3, teach every element of claim 16 except for a masking element. Stabile teaches a parallel detection system that uses optical detection to analyze the content of wells. The optical system is best shown in Figure 3A and includes a window array. The window array has transparent windows which may be closed at a given moment so that only a given subset of cells is illuminated at a given moment. It would have been obvious to one of

ordinary skill in the art to combine the window array of Stabile with the combined teachings of Mian and Kellogg. One would add the window array of Stabile in order to obtain the benefits of isolating certain cells from illumination as taught by Stabile.

7. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mian et al. (6,319,469) and Kellogg et al. (6,143,248) and further in view of Sheppard et al. (6,143,247). Mian and Kellogg, as combined above in paragraph 3, teach every element of claims except for a three dimensional attachment of molecules. Sheppard teaches an affinity binding based system for detecting particles/compounds. In their system Sheppard et al. teach the use of covalently bound binding reagents to bind analytes of interest in channels or chambers so they can be analyzed. The covalently bound reagents may comprise a three-dimensional structure to bind particulates. It would have been obvious to one ordinary skill in the art to combine the immobilization teachings of Sheppard with the combined teachings of Mian and Kellogg. One would immobilize affinity/binding molecules in more than one dimension to provide the greatest amount of surface area possible to bind analytes of interest.

### ***Response to Arguments***

8. Applicant's arguments with all claims have been considered but are moot in view of the new ground(s) of rejection. Applicant has amended the independent claims to include the limitation of tapered channels. This was sufficient to overcome the previous

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102 rejections made by the Examiner. The Examiner believes that he has addressed this new limitation with a new rejection involving the references Mian and Kellogg.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dwayne K Handy whose telephone number is (571)-272-1259. The examiner can normally be reached on M-F 8:00-4:30.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DKH  
December 27, 2004

A handwritten signature in black ink, reading "Arlen Soderquist". The signature is fluid and cursive, with the last name "Soderquist" being more prominent and ending in a large, sweeping "D".

ARLEN SODERQUIST  
PRIMARY EXAMINER